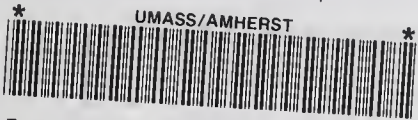


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Office of Technical Assistance
Executive Office of Environmental Affairs
Commonwealth of Massachusetts

Toxics Use Reduction Case Study

METALS RECOVERY AND WASTEWATER REDUCTION AT HI-TECH GOLD PLATING CORP.

SUMMARY

Hi-Tech Gold Plating Corporation installed an electrolytic metals recovery system, implemented counterflow rinsing, and made several other minor modifications to its plating lines in order to reduce its use of toxic substances while enhancing profits. These changes resulted in a dramatic cutback in water consumption, together with significant reductions in discharges of metals and other wastewater contaminants. This environmentally sound investment paid for itself in about one year.

BACKGROUND

Hi-Tech Gold is a nine-worker plating job-shop located in Worcester, Massachusetts that makes precision computer components. The manufacturing process includes two plating lines -- one for copper, nickel and gold, and the other for silver and tin. Before parts enter either line, their surfaces are cleaned in a pickling tank.

Before it began to explore Toxics Use Reduction (TUR) opportunities, Hi-Tech used metal reclamation units only in the gold and silver drag-out (rinse) tanks. Hi-Tech's wastewater contaminant concentrations were within the operating limits set by the local sewer authority, but the firm was aware that stricter discharge limits were being proposed, and that these more exacting limits would eventually require modifications in its plating lines, equipment, and/or work practices. These considerations prompted Hi-Tech to launch a proactive investigation of process modifications that would reduce the concentrations of metals and other contaminants in its wastewater.

OTA CONSULTATION

In January of 1990, Hi-Tech Vice President Jerry Thiboutot attended a workshop sponsored by the state Office of Technical Assistance (OTA). At the workshop, Mr. Thiboutot learned that other plating companies similar to Hi-Tech had decreased water consumption and reduced the level of contaminants in their wastewater by improving their rinsing and metals recovery systems. After the workshop, he visited two such companies.

These experiences convinced Mr. Thiboutot that the way to prepare for more stringent discharge limits was not through better wastewater treatment, but through Toxics Use Reduction -- that is, through production line changes that prevent pollution by reducing the use of toxic substances and/or the generation of toxic byproducts. Hi-Tech aimed its reduction efforts at two key wastewater contaminants -- metals and solvent-based cleaners.

TOXICS USE REDUCTION MODIFICATIONS

Hi-Tech chose to make two major modifications to its plating lines. The firm added an electrolytic metals recovery systems to its copper, nickel, lead and tin operations (Figure 1), and provided for counterflow rinsing (rinsewater recirculation) in all plating processes (Figure 2). To minimize costs, second-hand recovery units, tanks



recycled paper

and other equipment were purchased and rejuvenated. Hi-Tech managed to make nearly all of these modifications with in-house personnel.

At the same time, Hi-Tech made a number of more minor TUR modifications to its plating lines: it removed five rinse valves to prevent wasteful overflows of rinsing tanks, it added a cyanide oxidation unit to reduce cyanide discharges to the sewer, it replaced the solvent-based cleaner trichloroethylene (TCE) with an aqueous-based metals cleaner, and it began to purchase steel coated with a thinner layer of preservative oils and grease.

RESULTS

Reductions Achieved: Hi-Tech's TUR efforts brought on a 75% reduction in water consumption, from roughly 8000 to 2000 gallons per day. Initial results indicate that the metals recovery units are removing at least 35% of the metals that previously went down the drain and into the sewer system. In addition, Hi-Tech reduced its discharges of cyanide and of fats, oil, and grease (FOG) by more than 50%. The FOG improvements were apparently due to the new steel supply.

Economics: The up-front equipment and labor costs ran to approximately \$2900. Yearly savings on water alone amount to about \$2600. Scrap metals recovered by the new system are expected to bring in about \$100 per year. And while the cost of the aqueous cleaner is higher than TCE 101, the new cleaning bath has been installed in a more efficient location, thus saving on time and labor costs. Based on these initial figures, the investment will pay for itself in about a year, and register a net increase in profits thereafter.

FIGURE 1: *Electrolytic Recovery System (Typical):*

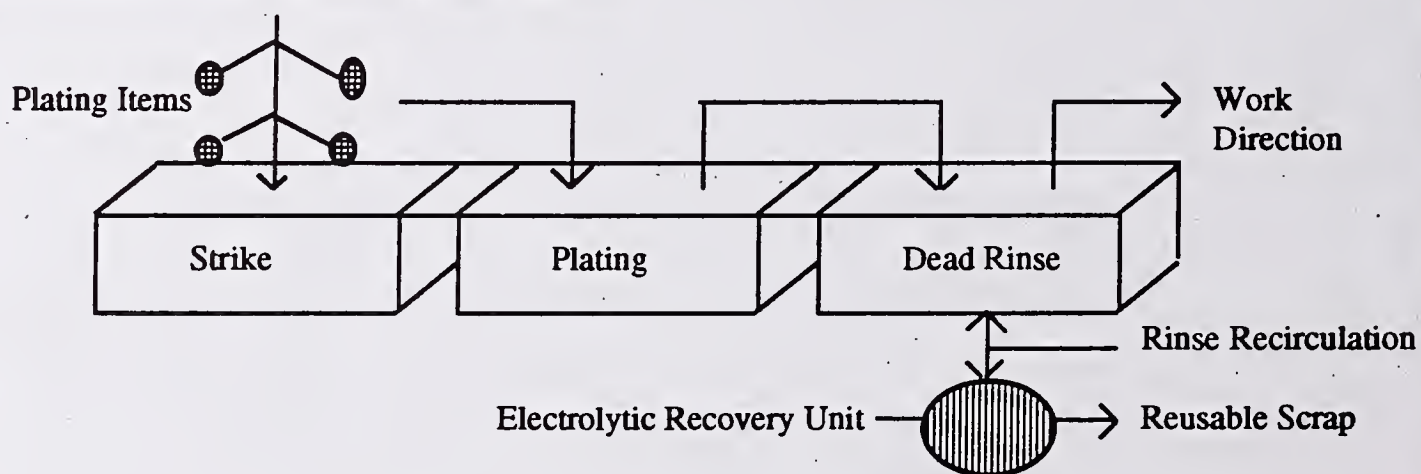
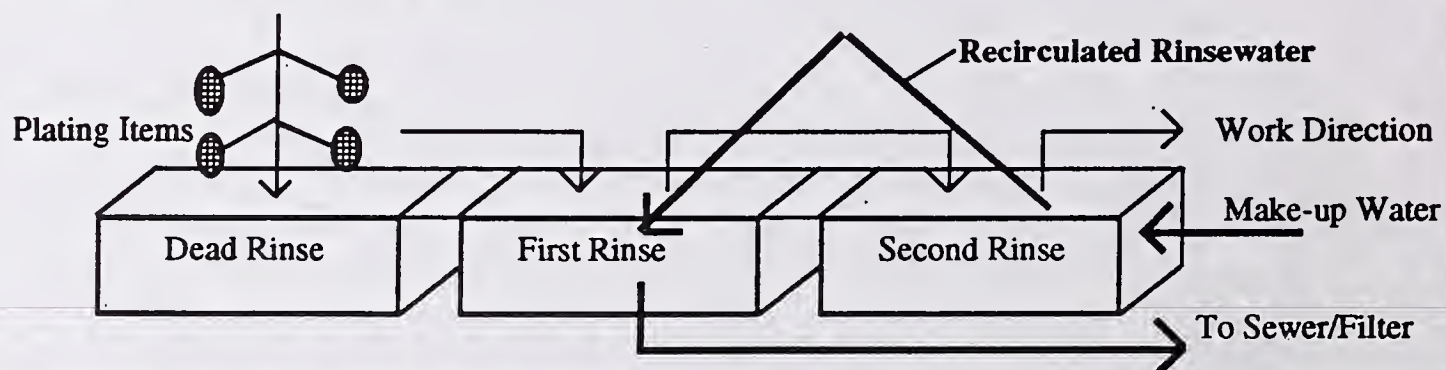


FIGURE 2: *Counterflow Rinsing (Typical):*



This Case Study is one of a series of such documents prepared by the Office of Technical Assistance (OTA), a branch of the Massachusetts Executive Office of Environmental Affairs whose mission is to assist industry in reducing the use of toxic chemicals and/or the generation of toxic manufacturing byproducts. OTA's non-regulatory services are available at no charge to Massachusetts businesses and institutions that use toxics. For further information about this or other case studies, or about OTA's technical services, contact: Office of Technical Assistance, Executive Office of Environmental Affairs, 100 Cambridge Street, Boston, Massachusetts 02202, or phone OTA at (617) 727-3260.